Tahlequah, her dead calf tell story of climate change

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Researchers confirmed the arrival of baby orca J61, pictured with mother Tahlequah, J35, swimming in Puget Sound, on Christmas Eve.

NOAA Fisheries

Tahlequah, or J35, carries the body of her dead calf in Puget Sound.

Body

Salmon that orcas depend on for survival under threat

SEATTLE – The stories of salmon and orcas in the Pacific Northwest are linked. Their paths intermingle in a vast web of ecosystems and coevolved species.

Salmon are struggling to survive. So are the families of endangered southern resident orcas, with a population of just 73, not improved in years. Their plight has been on full display, capturing worldwide attention yet again as mother orca Tahlequah this winter has carried her dead calf that lived only about a week.

She did the same thing in 2018, carrying another baby calf that lived only a half-hour, for 17 days and over 1,000 miles. Both lost calves were females, devastating for a population needing to rebuild.

The web of influences that impact orcas, especially the lack of salmon, reveals a stark lesson about climate change. It is a wrecker of the balance of life on which the natural world, which makes the Northwest so special, depends.

Widespread declines of wild chinook salmon have hurt fisheries, tribal cultures and ecosystems that depend on the fish, especially the southern residents. They eat other fish but preferentially target chinook, the biggest, fattiest salmon in the sea.

A key to orca survival is for more of the runs they depend on to improve, so they get enough food. Lack of regularly available, quality food is one of the biggest threats to their survival.

What salmon are hurting the most?

All three southern resident pods, or families, take fish from the Columbia and Snake rivers. Snake River spring/summer chinook are of particular importance for their size and high fat content; they are crucial food in a lean season.

Declines in wild Snake River spring/summer chinook over the past century were driven by overfishing and migration barriers, including dams, water diversions for irrigation, salmon farms and hatcheries. The species was federally listed as threatened in 1992 and has continued to dwindle toward extinction.

Now research shows salmon will be hammered by climate change in both their freshwater and ocean life stages. In streams, lethal conditions for salmon are predicted across the state. Interior Columbia Basin populations of salmon face the largest percentage loss of snow-dominated habitat, as temperatures warm, causing summer droughts and scouring winter floods.

In the ocean, rising surface temperatures also pose an overriding threat to salmon, upending ocean food webs and predator communities, scientists predicted in a 2021 paper.

What is Tahlequah telling us?

Scientists know this much for certain: Climate change is a killer even for the most productive chinook spawning grounds in the Columbia Basin, threatening a life source for the southern resident orcas. The

chinook that orcas depend on for survival are under unprecedented threat due to warming sea surface temperatures and streams.

When they modeled predictions of climate change on the life cycle of the salmon, even the largest spring/summer chinook populations today in the basin of the Salmon River crashed to near-extinction levels by 2060, with fewer than 50 adult fish returning to their spawning beds, the scientists found.

Negative effects from rising sea surface temperatures will drive most populations to extinction within this century, the scientists concluded.

Salmon are geniuses at adaptation. But even by running out to sea earlier, or shifting their run time back to the river by multiple days, they could not overcome the lethal effect of warming sea surface temperatures enough to beat extinction in a warming world, the scientists predicted.

What have been some salmon bright spots?

The good news is that where humans have made big changes for wild salmon recovery, salmon are responding.

On the Elwha, where two dams were taken down to recover the river's legendary salmon runs, and habitat work continues, steelhead, coho and chinook are coming back.

On the Upper Columbia, better water management has boosted sockeye to record runs in modern times, delighting sport fishermen and bringing precious food home to Upper Columbia tribes – even after crossing nine dams to get to spawning streams in British Columbia. The Okanagan Nation Alliance tribal communities got the breakthrough going, with an invitation to Canadian fisheries officials to work together with them and dam managers to help the run.

Meanwhile, work by the Nez Perce Tribe, in collaboration with other partners, has brought back the run of fall chinook in the Snake River from near extinction to the most successful chinook run on the river, benefiting sport and commercial fishermen, as well as tribal fishers.

And from the eastern side of Vancouver Island to Hood Canal, chum numbers saw a boost last fall, returning home in runs bigger than had been seen in decades. The chum boom follows decades of habitat work. Independent researcher Alexandra Morton also noted in a recent study that getting most of the Atlantic salmon fish farms out of a crucial migratory corridor for baby salmon east of Vancouver Island greatly reduced pathogens they encounter, including sea lice.

Three years after the fish pens came out, the 2024 chum runs kaboomed from Alert Bay in the Broughton Archipelago all the way to Puget Sound, with adult returns in this region increasing 10 to 20 times their usual numbers in one generation, Morton noted.

"The overarching feeling is incredible respect for these fish; chum were doing so poorly, it was theorized it was over for them," Morton said. "Yet when we gave them something they need, they showed remarkable resilience; it was extraordinary.

When the fish came back, so did the orcas. Week after week last fall during the chum run, Morton listened to the sounds of the northern resident orcas – who like the southern residents primarily eat salmon – swimming past underwater microphones, their voices broadcast on speakers filling her home. The southern residents also visited central Puget Sound waters day after day last fall, chasing chum.

With climate change, what's the outlook?

Perhaps an ecological surprise will occur, said Brian Burke, a supervisory biologist at the Northwest Fisheries Science Center in Seattle. What the future ocean will be like is not known. "How are those dynamics going to change?" Burke said.

But this much is certain: There is no easy way to fix declines in marine survival, he noted, and there certainly is no one silver bullet to recover Snake River Basin salmon runs, not even dam removal.

NOAA in a September 2022 report stated returning Columbia Basin salmon will require multiple fixes across all life stages of salmon, including dam removal on the Lower Snake River. Meanwhile, hunger stalks the southern residents.

Once producing 1.5 million Snake River spring/summer chinook a year, today runs are 10 percent of that in a good conditions. "It would be like going to the grocery store and there is no food available," said Rick Williams, co-author of the book "Managed Extinction" and fish biologist based in Eagle River, Idaho, about the decline of wild salmon in the Pacific Northwest.

Poor ocean conditions make it even more important to improve the freshwater habitat, Williams said.

"The ocean is going to be really hard to control and manage; the flip side of that is it makes it imperative that we do what we can in the freshwater environments," Williams said. People can count on nature, though, he added. Given a chance, species of salmon in multiple Northwest rivers have shown they will rebound.

"The fish have the capacity to come back," Williams said, "if we give them the opportunity."

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